

IMPROVED CLAMSHELL APPARATUS WITH DYNAMIC UNIFORMITY CONTROL

ABSTRACT OF THE DISCLOSURE

5 The present invention includes apparatus and methods for measuring impedance
of a layer of deposited metal on a substrate and controlling deposition uniformity during
electroplating. A first circuit delivers plating current to a metal layer on the substrate,
and a second circuit, electrically isolated from the first, measures the impedance.
Methods of the invention provide multi-point sheet resistance measurements before and
10 during an electroplating process on a substrate. In a specific example, resistance is
measured via a copper seed layer during electroplating.